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EVALUATION OF TEMBIND 35 DUST PALLIATIVE

MATERIALS INFORMATION

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MINISTRY OF TRANSPORTATION
AND COMMUNICATIONS

EVALUATION OF

TEMBIND 35

DUST

PALLIATIVE

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SUMMARY

Tembind 35, a dust palliative, is an ammonium based lignosulphate obtained from Temfibre Inc. of Temiscaming, Quebec. In 1984, thirteen test sections were placed in Southern Ontario and were monitored by the Bituminous Section for dust suppressant effectiveness. The Tembind concentrate was diluted at a central location to a 35% solids solution and was ready for application on arrival at the test site. The Tembind 35 was sprayed directly on the prepared granular road in two or three applications about 1/2 hour apart for a total application rate of approximately 2.2 L/m^2. The dust suppressant performance was subjectively rated as fair to good over the summer months.

In 1985, the Ministry of Environment monitored the effects of Tembind 25 (25% solids) on water quality and fisheries on one trial section. Results of this test indicated that there was no good reason to prohibit the use of Tembind 25 provided that a single application rate does not exceed 1.5 L/m^2 and the total application rate does not exceed 2.6 L/m^2 per treatment.

Based on this study, the Bituminous Section recommends the use of Tembind 35 as a dust palliative and that subsidy for its use be provided to Municipalities.

1. INTRODUCTION

1.1 General

The Bituminous Section was requested by the New Products Committee (N.P.C.) of the Ministry to evaluate the dust palliative Tembind 35 for effectiveness in Southern Ontario.

Tembind 35 is an ammonium based lignosulphate available from Temfibre Inc. of Temiscaming, Quebec. Various concentrations of Tembind are available depending on the percentage of solids. Tembind 35 contains 35% solids.

Thirteen test sections were carried out in 1984 in Southern Ontario. In these tests Tembind 35 was sprayed on prepared granular bases in 2 or 3 applications about 1/2 hour apart. This report details the dust suppressant ability of Tembind 35 and two comparative products.

1.2 Guidelines for Dust Palliative Trials

The Ministry requires that field trials of new products must be placed adjacent to waste oil or calcium chloride so that performance can be compared. Six out of thirteen test sections had comparative materials sprayed nearby. The Ministry guidelines for subsidy of the trials are contained in the Appendix 9.4.

2. CONSTRUCTION

2.1 Dilution Procedure

The Tembind concentrate was diluted with water to a 35% solids solution at the Canam plant in Breslau, Ontario. The Tembind 35 was ready to spray at ambient temperatures upon arrival at the test sections after brief agitation in the distribution.

2.2 Equipment

The standard distributor for spraying waste oil consisting of a tank, pump and spray bar was used to spray Tembind 35.

2.3 Preparation of the Granular Grade

Prior to spraying the Tembind 35 the granular grades were cut and shaped with a grader similar to preparing for waste oil or calcium chloride applications. At 2 of the 13 test sites, the granular was mixed with a grader by blading the material back and forth across the road, before and after spraying with Tembind 35.

2.4 Test Sections

In eleven of the thirteen trials, the Tembind 35 was sprayed at a pre-determined rate (from 0.76 to 3.75 L/m^2) in multiple applications. The second and third applications were usually applied within 1/2 to 1 hour of the initial application. The multiple applications were necessary to allow the Tembind 35 to soak into the granular material. If too much Tembind 35 was applied at once, the Tembind 35 was not absorbed and ran off the road surface. In the other two trials, the road material was loosened and Tembind 35 was sprayed and mixed into the road material. A summary of the test sections can be found in Table 9.1 of the Appendix. Also found in the Appendix are the evaluation of dust palliative application sheets completed for each test section. Following are details of the spraying at each test section of Tembind 35 and the comparative product where applicable.

Town of Milton

The 4th Line North, from Steeles Ave. northerly for 2.7 km was sprayed with waste oil and Tembind 35 on 84 05 17. Traffic is fairly heavy on the 4th Line with 1039 vehicles per day recorded on September 10 and 11, 1984.

The granular grade was recently graded with about 3 to 15 mm of loose float. The road was dry and dusty at the time of spraying. The granular material was from a gravel source.

The Tembind 35 was sprayed in 2 applications for a total application rate of 1.58 L/m^2. The Tembind 35 penetrated into the granular base 6 to 15 mm. Tracking and pick-up of the Tembind 35 was very light. There was moderate run-off and splashing onto passing vehicles.

The waste oil, also applied on 84 05 17, was sprayed in one application at 1.41 L/m^2. The waste oil penetrated 6 to 10 mm into the road. Tracking of the waste oil and splashing onto passing vehicles was moderate to heavy. There was no run-off of oil observed at the time of spraying.

A second application of Tembind 35 was made 4 months later, on 84 09 14, over the original application. The road was cut and shaped and sprayed with

Tembind 35 at 1.79 L/m^2. A Ministry observer was not present during this application.

Town of Thornbury

A single light application of Tembind 35 was made on various streets in June. Two months later a second similar application was made. Each application was approximately 0.76 L/m^2 for a total rate of 1.52 L/m^2. A Ministry representative was not present during either application.

St. Lawrence Seaway (St. Catharines)

Door Drive was sprayed with Tembind 35 on 84 06 04. The total application rate of Tembind 35 was approximately 3.75 L/m^2. A Ministry representative was not present during this application of Tembind 35.

Township of West Lincoln

The South Grimsby Road 18, south of Hwy. 20, was sprayed with Tembind 35 on 84 06 05. The road was graded prior to spraying and the base material was from a gravel source. The road was dry and very dusty with 13 mm of loose float over a very hard grade, at the time of spraying.

The Tembind 35 was sprayed in 2 applications, (3 at the intersection of Hwy. 20), for a total application rate of 2.23 L/m^2. After the first application, small spots of gravel were left exposed. The exposed spots disappeared after the 2nd application of Tembind 35. The Tembind 35 penetrated into the gravel 3 to 6 mm. There was light tracking, pick-up and run off of the Tembind 35. There was light to moderate splashing of the Tembind 35 onto passing vehicles. The Township received two or three complaints about Tembind 35 splashing onto cars and one complaint from a motorcyclist.

North of Hwy. 20, Road 18 was treated with liquid calcium chloride about one week prior to the spraying of Tembind 35. The granular grade appeared to be in similar condition to Road 18 where the Tembind 35 was applied. Mr. E. Griffin the road superintendent said that the liquid calcium chloride was applied at approximately 3.4 t/km. A Ministry representative was not present to observe the application of calcium chloride.

Walpole Island

Two roads in Walpole Island Indian Reserve were sprayed with Tembind 35 on 84 06 06. A Ministry representative was not present during the application.

Town of St. Mary's

Concession 19 of Blanchard Township and various streets in the Town of St. Mary's were sprayed with Tembind 35 on 84 06 12. The granular material on Concession 19 was clean and from a gravel source. The road had been graded 3 or 4 days previously and had 10 to 40 mm of loose float over a hard surface. The granular material was placed in 1984 and the road was dry at the time of spraying.

Tembind 35 was sprayed in two applications on Concession 19 for a total application rate of 1.90 L/m^2. The Tembind penetrated the granular material 12 to 20 mm. There was light tracking, pick-up and splashing onto vehicles, and no run-off.

Liquid calcium chloride was applied to Concession 19 immediately south of the Tembind 35, about one week earlier. The granular material and grade were similar to the section with Tembind 35. Mr. Hawkins of the Town of St. Mary's estimated the application rate of calcium to be 3.4 t/km.

When the application of Tembind 35 was completed on Concession 19, the distributor moved to the Town of St. Mary's. The gravel streets had been shaped earlier in the week and were free from potholes. Some of the gravel streets had had waste oil applications last year. Tembind 35 was applied in a single application at approximately 1.09 L/m^2. Accurate application rates were not available because of the many short streets treated. There was light tracking, no pick-up or run-off, and light splashing onto vehicles of the Tembind 35. About 2 weeks after the application of Tembind 35 on Concession 19 and the town streets, a second light application of Tembind 35 (0.82 to 1.09 L/m^2) was made to Concession 19 and to about one half of the town streets. The second application was done during a light rain, which appeared to aid in the penetration of the Tembind 35, according to Mr. Hawkins.

Town of Bracebridge

Stephens Bay Road and Robert Dollar Drive received applications of Tembind 35 on 84 06 13. Stephens Bay Road, a cottage road, has a very sandy granular material obtained from a gravel source. There was 10 mm of loose material and the road was damp at the time of spraying. The grader just completed shaping the road when the Tembind 35 was applied. A total of 1.85 L/m^2 of Tembind 35 was applied in 2 applications. The Tembind 35 penetrated into the road 6 to 14 mm. There was no tracking or pick-up, and there was light run-off and splashing onto vehicles of the Tembind 35.

Four weeks after the first application, a second application of Tembind 35 was made on Stephens Bay Road. Fowler Construction were working along the road making the second application necessary. The road was graded prior to the second application (1.47 L/m^2) of Tembind 35.

Robert Dollar Drive, a dead end road, was treated with Tembind 35 on 84 06 13. The granular material was clean, damp and from a gravel source. The road, which was already smoothly graded, was cut with a grader to a depth of 4 cm prior to spraying. A single application (1.85 L/m^2) of Tembind 35 was made over the loosened granular. The Tembind 35 penetrated into the granular about 12 mm. It was evident that the loosened granular grade could have absorbed considerably more Tembind 35, but there was no more Tembind available on the job. There was light tracking, pick-up and splashing onto vehicles, and no run-off.

Township of Pittsburg

Leo Lake Road in the Township of Pittsburg was treated with Tembind 35 on 84 06 14. The road was lightly travelled with an estimated 50 AADT traffic count. The granular material, recently applied, was limestone from a quarry source. The road was lightly graded just prior to spraying and was hard in the wheel tracks, with about 4 cm of loose float along the edges. The road was dry at the time of spraying.

The southerly portion of Leo Lake Road was sprayed with 2 applications of Tembind 35 and the loose float along the edges was bladed into the centre of the road. Two more applications of Tembind 35 were then sprayed over the loose float for a total of 2.50 L/m^2. The Tembind 35 penetrated 10 to 25 mm into the granular base.

The northerly half of Leo Lake Road was in similar condition, i.e. hard packed in the wheel tracks and at centreline, with about 4 cm of loose float along the edges. Three applications of Tembind 35 were sprayed for a total application rate of 2.01 L/m^2. Three applications were made because of the hardness of the limestone base. Penetration of the Tembind 35 into the limestone base averaged 5 mm.

On both the southerly and northerly portions the Tembind 35 did not pick-up. There was light tracking, run-off and splashing onto vehicles. The overall average application rate of Tembind 35 was 2.34 L/m^2 for both portions.

Township of Tiny

Beach Road was sprayed with Tembind 35 on 84 06 14. Beach road was reconstructed in 1983. The Tembind 35 was applied in two applications for a total application rate of 2.83 L/m^2.

Waste oil was applied on a nearby road in one application at approximately 1.36 L/m^2 on 84 06 07. A Ministry representative was not present for the Tembind 35 or the waste oil applications.

Township of Tecumseth

Tembind 35 was sprayed on 84 06 22 on Concession 9 from County Road 10 westerly to the Adjala Tecumseth Townline. Waste oil was applied earlier on 84 06 07 on Concession 9 east of County Road 10. A Ministry representative was not present during the waste oil application.

The granular grade where the Tembind 35 was applied was from a gravel pit source and was dry and dusty with about 1 cm of loose float. The granular was sampled from the road, graded and later found to comply with specifications, with 7.1% passing the 75 um sieve. See Table 9.3 in the Appendix for complete gradation. The Granular A was placed last fall.

Two applications of Tembind 35 were sprayed, for a total application rate of 2.23 L/m^2. The particular type of granular did not readily absorb the Tembind 35, penetration ranged from 2 mm in the hard sections to 10 mm in the loose sections. There was light tracking of the Tembind 35, moderate pick-up, run-off and splashing onto passing vehicles.

Townships of Palmerston, North and South Canonto

Three main roads were treated with Tembind 35, however, a Ministry representative was present only on Gulley Road at Mississippi. The granular material on Gulley Road was from a quarry source, was graded and damp at the time of spraying. Some sections had had calcium chloride last year, while other sections were fresh granular. A single application of Tembind 35 was applied and the application rate was not obtained because of an equipment breakdown. The single application of Tembind 35 penetrated into the granular grade approximately 12 mm. There was no tracking, pick-up or run-off of the Tembind 35. There was light splashing onto passing vehicles.

3. PERFORMANCE

The Tembind 35 and comparative materials were inspected for ability to control dust by observing passing vehicles, and by estimating the roughness or degree of potholing of the road. The inspections were not done at regular intervals. A summary of the test sections can be found in Appendix 9.1 and the follow-up dust inspection sheets and can be found in Appendix 9.6.

Town of Milton

The first application of Tembind 35 controlled dust for about 2 months. During the next 2 months, the dust gradually increased until the road was dusty with passing cars. Light potholing began after 1 month and progressively worsened until grading at 3 months after spraying.

The road was graded and re-sprayed with Tembind 35 on 84 09 14 approximately 4 months after the first application. Two weeks later there was light dust and heavy potholing in three well defined sections. These sections were graded on 84 09 27. Approximately 2 months after the second application, there was moderate dust and heavy potholing in the three above mentioned sections. There was moderate potholing on the rest of the road.

The waste oil applied only once remained dust free and smooth over a 6 month period (May to November). Minor sections of the oiled surface had deteriorated and were spray patched with asphalt emulsion and chips. Otherwise, the oiled section was maintenance free for the entire summer.

Both sections, the Tembind 35 and the waste oil were subjected to the same traffic count of 1039 cars per day. The single application of waste oil clearly out performed the two applications of Tembind 35. The overall rating is fair for the Tembind 35 when compared to the waste oil.

Town of Thornbury

One month after the first Tembind 35 application, there was light dust and light potholing frequency. Two months after the second application of Tembind 35, there was moderate dust from a car travelling at 60 km/h and light potholing frequency. Mr. Ashton of the Town of Thornbury had not received any complaints of dust from the Town residents. Mr. Ashton said that he would use the Tembind 35 again.

The one application of waste oil remained dust free the entire summer with light potholing.

St. Lawrence Seaway (St. Catharines)

One month after the Tembind 35 application the road surface was hard and stabilized, with some alligator cracking evident. There was light dust and a light frequency of potholing. Three months later, the road was still in good condition, with light dust and with a light frequency of potholing.

Township of West Lincoln

One month after application, the Tembind 35 was moderately dusty with a moderate amount of potholes. Three months later, the Tembind had been graded twice and was very dusty. There were no potholes as the road had been graded the day before the inspection.

The calcium chloride after three months was in similar condition to the Tembind 35; very dusty and smooth as it had just been graded.

Mr. E. Griffin of West Lincoln Township was not satisfied with the performance of the Tembind 35; he had received complaints from motorists because of splashing onto vehicles at the time of spraying, the Tembind 35 appeared to wash off and it was not controlling dust.

Walpole Island

Mr. W. Williams of Walpole Island said that 2 subdivision roads had been sprayed with Tembind 35. The road that had had one application of Tembind 35 was resprayed with waste oil. The second road, with 2 applications, held the dust down. Light grading was required 3 or 4 times over the summer. Mr. Williams said that he received complaints about the odour of the Tembind.

Town of St. Mary's, Concession 19

Approximately 6 weeks after the application of Tembind 35, there was light dust and light potholing frequency. The calcium chloride also had light dust and was slightly smoother with fewer potholes than the Tembind 35 section.

Town of St. Mary's, Various Streets

Streets with light traffic, 6 weeks after spraying, had light dust and light potholing frequency. Two streets, St. Maria and Arena Road, had moderate dust and moderate potholing frequency. Much of the Tembind 35 had been washed away on St. Maria St. as it was on a steep hill. None of the streets had been graded as of the 84 07 31 inspection. Mr. Hawkins of the Town of St. Mary's said that the Tembind 35 worked well on roads that were shaded. He was not happy with the overall performance of the Tembind 35.

Town of Bracebridge, Stephen's Bay Road

Approximately 2 weeks after the first application of Tembind 35, the hills and corners were graded and the Town received complaints about dust. There were heavy trucks hauling to a construction site during this period.

Four weeks after the second application of Tembind 35, the Town informed me that the hills and corners were dusty, though not as bad as after the first application and required grading.

Mr. H. Muntz of the Town of Bracebridge commented that the Tembind 35 worked best on a clay base, but did not outperform calcium chloride and he would not recommend Tembind 35 for sandy or gravel bases.

Town of Bracebridge, Robert Dollar Drive

Five weeks after the single application of Tembind 35, the road was dusty, rough, and in need of grading. The road is a dead end street with all traffic either stopping, starting or turning. The traffic plus a light application of Tembind 35 may account for the below average performance of the Tembind 35.

Township of Pittsburg

Two weeks after the application of Tembind 35, Leo Lake Road was smooth and free of potholes. The road was damp during this inspection so that dust control could not be properly rated. Nine weeks after spraying, the road had light dust and light potholing frequency. There was no noticeable difference between the north and south sections. The south section had Tembind 35 mixed in with the grader, while the north had had spray applications and no mixing.

Mr. Scott of Pittsburg Township reported after 5 months that there was no dust, very few holes and the road had not been graded. He also reported that the rain did not seem to affect the Tembind 35.

Township of Tiny

One month after spraying the Tembind 35 Beach Road had light dust and light potholing frequency. Four months after spraying, the road had been lightly graded about three times. Mr. Marcellus of the Township of Tiny said that the road was dusty after grading, but after 2 or 3 showers the Tembind 35 would control the dust again.

The road treated with waste oil was dust free and had light potholing after one month. Four months later, the curves were dusty and rough. The curves were graded 3 times. The waste oil on the tangent sections was smooth and dust free.

Township of Tecumseth

Two months after spraying the Tembind 35, Concession 9 was in good condition with light dust and light potholing frequency. The waste oil section was smooth and dust free over 75% of the surface area. The remaining 25% had light dust and moderate potholing. Neither the Tembind 35 or the waste oil had been graded.

Approximately 3 months after spraying on 84 10 02, the Tembind 35 had been graded for the first time and was very dusty. About 50% of the waste oil area had been graded twice and was moderately dusty on 84 10 02. The remaining 50% was smooth and dust free.

After 4 months the Tembind 35 had been graded 3 times and controlled dust in the damp areas only. The drier sections of the road were moderately dusty. The waste oil had been graded about 5 times since application over 70% of the surface area, with moderate dust. The remaining 30% was smooth with light dust.

Townships of Palmerston, North and South Canonto

Gulley Road, 2 months after spraying with Tembind 35, had light to moderate dust on the level sections. The hills had been graded twice and were dusty.

Lake Road, at Ompah had light dust on the level sections. The hills had been graded once since spraying and were moderately dusty.

Ardoch Road, at Ompah, 2 months after spraying the Tembind 35, had light dust on the level sections. The hills had been graded twice and had heavy dust.

4. ENVIRONMENTAL CONCERNS

Tembind 35 is water soluble and is dissolved by rain water. Coloured rain water was observed in potholes and ditches in the Towns of Milton, St.Mary's and Thornbury and in the Township of Pittsburg at the follow-up inspections. The amount of Tembind 35 that is dissolved and is washed away varies depending upon the amount of rain, the number of hills and the type of granular base material.

An evironmental study was carried out on Leo Lake Road in the Township of Pittsburg in 1985. The Ministry of Environment (MOE) monitored the effects of Tembind 25 upon water quality and fisheries. Results from this test indicated that there was no good reason to prohibit the use of Tembind 25, provided that a single application did not exceed 1.5 L/m^2 and the total application did not exceed 2.6 L/m^2 per treatment. The correspondence from the MOE can be found in Appendix 9.7.

5. COST COMPARISONS

The weighted average application rate of Tembind 35 used in the trial areas was 2.17 L/m^2. Medium application rates of waste oil and flake calcium chloride are considered to be 1.36 L/m^2 and 1.09 kg/m^2 respectively. The approximate 1984 prices were 12.1¢/L for Tembind 35, 18.9¢/L for waste oil and $200.00/tonne for flake calcium chloride. The approximate costs to supply and apply dust control materials, per km x 5 m wide were:

Tembind 35	10,850	X	0.121	= $1312.85
Waste Oil	6,800	X	0.189	= $1285.20
Flake Calcium Chloride	5.45	X	200.00	= $1090.00

6. COMPARISON OF PERFORMANCE AND COSTS

Calcium chloride and waste oil historically are good dust palliatives and there is considerable experience available on the performance of these materials. Liqnosulphonates such as Termbind 35 have a much shorter history of performance, at least in Ontario.

A comparison of the dust control effectiveness, resistance to potholing and costs of the three materials is shown in Table 1. The purpose is to compare Tembind 35 with the two established products. The dust control demonstrated in the various test sections, was assigned a rating with a maximum of 10 for no dust. The resistance to potholing was rated in a similar manner with a maximum rating of 10 for no potholes. The cost factor was given a maximum rating of 20 for the least expensive as cost is a major consideration when choosing a dust palliative. Calcium chloride was assigned 20 because it was the least expensive, waste oil 17 and Tembind 35 a cost rating of 16.6. The cost ratings are based on a mathematical calculation.

The percent rating was obtained by adding the three ratings, dividing by 40 and multiplying by 100. Calcium chloride and waste oil had similar ratings of 92 and 91 percent respectively. The Tembind 35 recieved a slightly lower rating of 83% because of its higher cost.

The conclusion, based on the limited data from the test sections, is that the Tembind 35 is relatively effective when compared with calcium chloride and waste oil. The percent ratings shown in Table 1 should not be used to choose one dust palliative over another. A more detailed comparison must be made in order to choose a material, considering such factors as cost of treatment per m^2, savings from reduced grading, the period of time dust is effectively suppressed, the reduction in granular material losses and environmental constraints. The comparison could include an untreated gravel road and possibly a bituminous surface treated road.

TABLE 1: PERFORMANCE AND COST RATINGS OF DUST PALLIATIVES

	Rating (1)			
	Maximum	Tembind 35	Waste Oil	Calcium Chloride
Dust Control	10	8.5	10.0	8.3
Resistance to Potholing	10	8.1	9.2	8.3
Cost (Typical,$/km)	20	16.6 (1312)	17.0 (1285)	20.0 (1090)
Total: (2)	40	33.2	36.2	36.6
Number of Sites (3)	-	16	4	2
Rating, % (4)	100	83	91	92

Notes:

(1) Rating: the higher the number is the better rating.

(2) Total: the sum of the ratings, excluding $/km.

(3) Number of test sections where the material was used.

(4) Rating, % = (Total ÷ 40) x 100.

7. LABORATORY TESTING OF TEMBIND 35

Samples of Tembind 35 were taken and tested in the laboratory for relative density at 15.6° C (60° F). The relative density of Tembind 35 should be approximately 1.17. Relative density is only an approximate method of determining the percent solids. The important active ingredients of Tembind must be determined by analysis to obtain the types and percentages of solids. The relative densities of the samples can be found in Table 9.2 of the Appendix.

8. OBSERVATIONS, CONCLUSIONS AND RECOMMENDATIONS

8.1 Observations

1. The dust control capability of waste oil is good.

2. The dust control capability of Tembind 35 is fair to good.

3. The dust control capability of calcium chloride is fair to good.

4. The degree of potholing of all three products is in the category of light to moderate. The least amount of potholing occurred with waste oil followed by calcium chloride followed by Tembind 35.

5. The application rates of Tembind 35 ranged from 0.76 to 3.75 L/m^2 and averaged 1.93 L/m^2.

6. Tembind 35 dissolves in rain water and was seen collecting in puddles and ditches at two test sections during the follow-up inspections.

7. The 1984 costs to supply and apply Tembind 35 and waste oil were similar, and both were more expensive than calcium chloride.

8.2 Conclusions

1. Tembind 35 is relatively effective in controlling dust and reducing potholing when compared with calcium chloride and waste oil.

2. The most effective application rate of Tembind 35 to control dust and minimize potholing is approximately 2.2 L/m2 (0.4 gal/sq yd), placed in two or three applications about 1/2 hour apart.

3. Roads treated with Tembind 35 can be lightly graded after a rain and still control dust, but to a lesser degree.

4. The Ministry of Environment carried out limited testing of ammonium based liqnosulphonate (Tembind 25) in 1985 and have permitted the use of Tembind provided that a single application does not exceed 1.5 L/m^2 and the total of multiple applications does not exceed 2.6 L/m^2 per treatment.

8.3 Recommendations

1. The Ministry should accept Tembind 35 as an alternative to calcium chloride and waste oil and should provide subsidy to the Municipalities. This recommendation is based on multiple spray applications for a total of 2.2 L/m^2 at 35% solids solution.

2. The dilution of the Tembind concentrate with water on site should be discouraged because of problems of achieving the correct dilution ratio and the risk of a spill.

3. Further research is necessary to determine the cost effectiveness of all types of dust palliatives. Information such as the cost of treatment per m^2, savings from reduced grading, the period of time the dust is effectively suppressed, the reduction in granular material losses and environmental constraints should be obtained.

Table 9.1, Tembind 35 Test Sections

LOCATION	TEMBIND 35					COMPARATIVE PRODUCT					
	DATE OF APPLICATION	APPLICATION RATE L/m^2	DUST CONTROL RATING	DEGREE OF POTHOLING	NO. OF TIMES GRADED AFTER APPLICATION	DATE OF APPLICATION	TYPE OF MATERIAL	APPLICATION RATE L/m^2	DUST CONTROL RATING	DEGREE OF POTHOLING	NO. OF TIMES GRADED AFTER APPLICATION
Town of Milton	84 05 17	1.58	FAIR	MODERATE	2[1]	84 05 17	WASTE OIL	1.41	GOOD	LIGHT[4]	0
Town of Milton	84 09 14	1.79	FAIR	MODERATE	2[1]	-	-	-	-	-	-
Town of Thornbury	84 06 04	0.76[1]	GOOD	LIGHT	0	84 05 24[1]	WASTE OIL	1.09[1]	GOOD	LIGHT	0
Town of Thornbury	84 07 31	0.76[1]	GOOD	MODERATE	0	-	-	-	-	-	-
St. Lawrence Seaway (St.Catharines)	84 06 04	3.75[1]	GOOD	LIGHT	0	-	-	-	-	-	-
Township of West Lincoln	84 06 05	2.23	FAIR	MODERATE	2	84 05 31[1]	CALCIUM CHLORIDE	3.38[5]	FAIR	MODERATE	2[1]
Walpole Island	84 06 06	2.45[1]	FAIR	MODERATE	-	-	-	-	-	-	-
Town of St. Marys Concession 19	84 06 12	1.90[2]	GOOD	LIGHT	0	84 06 05[1]	CALCIUM CHLORIDE	3.38[5]	GOOD	LIGHT	0
Town of St. Marys Various Streets	84 06 12	1.09[1,2]	FAIR	LIGHT	0	-	-	-	-	-	-
Town of Bracebridge Stephen's Bay Road	84 06 13	1.85	GOOD	LIGHT	0	-	-	-	-	-	-

Table 9.1, Tembind 35 Test Sections (Continued)

LOCATION	TEMBIND 35					COMPARATIVE PRODUCT					
	DATE OF APPLICATION	APPLICATION RATE L/m^2	DUST CONTROL RATING	DEGREE OF POTHOLING	NO. OF TIMES GRADED AFTER APPLICATION	DATE OF APPLICATION	TYPE OF MATERIAL	APPLICATION RATE L/m^2	DUST CONTROL RATING	DEGREE OF POTHOLING	NO. OF TIMES GRADED AFTER APPLICATION
Stephen's Bay Road	84 07 18	1.47	GOOD	LIGHT	0	-	-	-	-	-	-
Town of Bracebridge Robert Dollar Dr.	84 06 13	1.85[3]	FAIR	HEAVY	0	-	-	-	-	-	-
Township of Pittsburg	84 06 14	2.34	GOOD	LIGHT	0	-	-	-	-	-	-
Township of Tiny	84 06 14	2.83	GOOD	LIGHT	3	84 06 07	WASTE OIL	1.36[1]	GOOD	LIGHT	3
Township of Tecumseh	84 06 22	2.23	GOOD	MODERATE	3	84 06 05[1]	WASTE OIL	1.79[1]	GOOD	MODERATE	5
Township of Palmerston, North and South Canonto	84 06 26	-	FAIR	MODERATE	1	-	-	-	-	-	-

NOTES:

1 Estimated.

2. Original application rate. A second light application (0.82 L/m^2 ±) was placed 2 weeks later.

3. Graded to a depth of 4 cm before application of Tembind.

4. Small breaks in the stabilized oil surface were spray patched with asphalt emulsion and aggregate.

5. Tonnes of liquid calcium chloride per km.

Table 9.2, Relative Densities of Tembind

Municipality	Relative Density at 15.6°C (60°F)	
	Tembind 35[1]	Tembind 50
Town of Milton	1.169	-
Twp. of West Lincoln	1.166	-
Town of St. Mary's	1.141	-
Twp. of Pittsburg	1.175[2]	-
Twp. of Tecumseth	1.157	-
Canam	1.190[4]	1.25[3]

NOTES:

1. The minimum relative density of Tembind 35 should be 1.17 according to Canam.
2. Very foamy, volume increased when stirred.
3. Sample of Tembind 50 obtained from Canam.
4. Tembind 50 diluted to 35% solids in MTC Laboratory.

Table 9.3, Granular "A" Gradation, Township of Tecumseth

MTC Sieve Designation mm	Percentage Passing	
	Township of Tecumseth[1]	MTC Requirement[2]
37.5	-	100
19.0	99.3	-
16.0	94.1	62 - 100
13.2	87.6	-
9.5	72.5	48 - 73
6.7	61.4	-
4.75	52.9	33 - 55
2.36	42.7	-
1.18	34.6	15 - 45
0.60	28.0	-
0.30	19.0	5 - 22
0.15	11.2	-
0.075	7.1	0 - 8

1. Sampled from road.
2. Ontario Provincial Standard Specification, OPSS 1010.

9.4 Guidelines

memorandum

Ontario

To: All Regional Directors
All District Engineers

Date: 1992 05 11

Attn: All Regional & District Municipal Engineers

Re: Dust Palliatives

The Ministry has been approached by suppliers of products which may be used as a dust palliative in lieu of waste oil or liquid calcium. One such product is Bond-All N.J. from Woodington Systems Inc.

The Ministry is prepared to subsidize trial of such products, but it is suggested that the trial should be located such that it may be compared against a competitive product (waste oil or liquid calcium) for evaluation purposes.

Interested municipalities are to be advised to contact the District Municipal Engineer in advance so that arrangements can be made with the road or works superintendent for suitable monitoring during the season such that a report on performance can be prepared.

The Ministry's Bituminous Section in Downsview may be contacted for technical advice. The Regional Municipal Engineer should ensure that the Head of that Section is aware of test site locations ~~creations~~ and findings. The following guidelines are suggested when considering setting up such trials.

(1) at least one mile in length, or
(2) one day's work, or
(3) 20,000 gallons of diluted product, or
(4) 50% of the dust palliative contract.

J. E. Heffernan
Manager
Municipal Roads Office
Downsview

JEH/FRM/lh

APR 18 1983

9.5 EVALUATION OF DUST PALLIATIVE APPLICATION

ROAD 4th Line MUNICIPALITY Town of Milton AADT 1039

NEW PRODUCT LOCATION: FROM 1.4 km north Steeles Northerly 1.3. km

COMPARATIVE PRODUCT LOCATION: FROM Steeles Ave. North 1.4 km.

NEW PRODUCT COST - per km COMPARATIVE PRODUCT COST - per km

CONDITION OF GRANULAR GRADE	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT Waste Oil
Granular From	Pit ☒ Quarry ☐	Pit ☒ Quarry ☐
Granular Condition	Clean ☐ Dirty ☒ Sandy ☐	Clean ☐ Dirty ☒ Sandy ☐
Graded	Yes ☒ No ☐	Yes ☒ No ☐
Compacted	Yes ☐ No ☒	Yes ☐ No ☒
Depth of Loose Float	.3 to 1.5 cm	.3 - 1.5 cm.
Moisture Condition of Grade	Dry ☒ Damp ☐ Wet ☐	Dry ☒ Damp ☐ Wet ☐
Treated Previously with Dust Palliative?	Yes ☒ No ☐	Yes ☒ No ☐
If yes specify type and years	Type Oil Year(s)82, 83	Type Oil Year(s)1982, 83
Remarks	Dusty before Tembind little evidence of oil	Grade Dusty before soraying;little evidence of Oil

APPLICATION RATES	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT Waste Oil
Length	1.3 km	1.4 km
Width	22 ft	23 ft
Concentrate	- gal	3000 gal
Dilution	3000 gal	3000 gal
Dilution Ratio	- : -	- : -
Application Rate	0.29 gal/sq yd Second application 84 09 14 0.33 gal/sq. yd.	0.26 gal/sq yd

RATING

1 None, 2 Light, 3 Moderate, 4 Heavy

SPRAYING	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT Waste Oil
Date	84 05 17	84 05 17
No. of Applications	Single ☐ Double ☒ Other ☐	Single ☒ Double ☐ Other ☐
Penetration	6-15 mm	6-10 mm
Tracking	1 ☐ 2 ☒ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☒ 4 ☐
Pick Up	1 ☐ 2 ☒ 3 ☐ 4 ☐	1 ☐ 2 ☒ 3 ☐ 4 ☐
Run Off	1 ☐ 2 ☐ 3 ☒ 4 ☐	1 ☒ 2 ☐ 3 ☐ 4 ☐
Splashing Onto Vehicle	1 ☐ 2 ☐ 3 ☒ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☒
Remarks		

9.5 EVALUATION OF DUST PALLIATIVE APPLICATION

ROAD South Grimsby Rd. 18 MUNICIPALITY Twp. West Lincoln AADT -

NEW PRODUCT LOCATION: FROM Hwy 20 Southerly TO 20 Road

COMPARATIVE PRODUCT LOCATION: FROM Hwy 20 Northerly TO 1.0 km.

NEW PRODUCT COST _____ per km COMPARATIVE PRODUCT COST _____ per km

CONDITION OF GRANULAR GRADE	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT Calcium Chloride
Granular From	Pit ☒ Quarry ☐	Pit ☒ Quarry ☐
Granular Condition	Clean ☐ Dirty ☒ Sandy ☐	Clean ☐ Dirty ☒ Sandy ☐
Graded	Yes ☒ No ☐	Yes ☒ No ☐
Compacted	Yes ☐ No ☒	Yes ☐ No ☒
Depth of Loose Float	1.3 cm	1.3 cm
Moisture Condition of Grade	Dry ☒ Damp ☐ Wet ☐	Dry ☒ Damp ☐ Wet ☐
Treated Previously with Dust Palliative?	Yes ☒ No ☐	Yes ☐ No ☐
If yes specify type and years	Type Bond al Year 1983	Type — Year(s) —
Remarks	Extremely dusty	Not present when sprayed.

APPLICATION RATES	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT Calcium Chloride
Length	2.0 km	1.0 km
Width	23 ft	22 ft
Concentrate	N/A gal	- gal
Dilution	6800 gal	- gal
Dilution Ratio	- : -	- : -
Application Rate	0.41 gal/sq yd	6 tons per mile

RATING

1 None, 2 Light, 3 Moderate, 4 Heavy

SPRAYING	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT Calcium Chloride
Date	84 06 05	84 05 31
No. of Applications	Single ☐ Double ☒ Other ☐	Single ☐ Double ☐ Other ☐
Penetration	3-6 mm	mm
Tracking	1 ☐ 2 ☒ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Pick Up	1 ☐ 2 ☒ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Run Off	1 ☐ 2 ☒ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Splashing Onto Vehicle	1 ☐ 2 ☐ 3 ☒ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Remarks	Triple application at Hwy 20 Intersection.	Not present when sprayed.

9.5 EVALUATION OF DUST PALLIATIVE APPLICATION

ROAD Blanshard Conc 19 MUNICIPALITY Town of St. Marys AADT -

NEW PRODUCT LOCATION: FROM Perth Rd. 28 South 0.3 km

COMPARATIVE PRODUCT LOCATION: FROM 0.3 km. South Rd. 28 Southerly

NEW PRODUCT COST - per km COMPARATIVE PRODUCT COST - per km

CONDITION OF GRANULAR GRADE	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT Calcium chloride
Granular From	Pit ☒ Quarry ☐	Pit ☒ Quarry ☐
Granular Condition	Clean ☒ Dirty ☐ Sandy ☐	Clean ☒ Dirty ☐ Sandy ☐
Graded	Yes ☐ No ☐	Yes ☐ No ☐
Compacted	Yes ☐ No ☒	Yes ☐ No ☒
Depth of Loose Float	1-4 cm	1-4 cm
Moisture Condition of Grade	Dry ☒ Damp ☐ Wet ☐	Dry ☐ Damp ☐ Wet ☐
Treated Previously with Dust Palliative?	Yes ☐ No ☒	Yes ☐ No ☐
If yes specify type and years	Type Year(s)	Type Year(s)
Remarks	New gravel this year	Not present when calcium chloride applied

APPLICATION RATES	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT Calcium chloride
Length	0.3 km	km
Width	20 ft	ft
Concentrate	N/A gal	gal
Dilution	775 gal	gal
Dilution Ratio	:	:
Application Rate	0.35 gal/sq yd Second application 0.15 gal/sq. yd. placed 84 06 26	gal/sq yd

RATING

1 None, 2 Light, 3 Moderate, 4 Heavy

SPRAYING	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT Calcium Chloride
Date	84 06 12	84 06 05
No. of Applications	Single ☐ Double ☒ Other ☐	Single ☐ Double ☐ Other ☐
Penetration	12 - 20 mm	mm
Tracking	1 ☐ 2 ☒ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Pick Up	1 ☒ 2 ☐ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Run Off	1 ☐ 2 ☒ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Splashing Onto Vehicle	1 ☐ 2 ☒ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Remarks		Not present when calcium chloride applied

9.5 EVALUATION OF DUST PALLIATIVE APPLICATION

ROAD Stephens Bay Road MUNICIPALITY Town of Bracebridge AADT light

NEW PRODUCT LOCATION: FROM Pavement easterly for ~~TO~~ x 1.5 km.

COMPARATIVE PRODUCT LOCATION: FROM — TO —

NEW PRODUCT COST - per km COMPARATIVE PRODUCT COST - per km

CONDITION OF GRANULAR GRADE	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT -
Granular From	Pit ☒ Quarry ☐	Pit ☐ Quarry ☐
Granular Condition	Clean ☐ Dirty ☒ Sandy ☒	Clean ☐ Dirty ☐ Sandy ☐
Graded	Yes ☒ No ☐	Yes ☐ No ☐
Compacted	Yes ☐ No ☒	Yes ☐ No ☐
Depth of Loose Float	1 cm	cm
Moisture Condition of Grade	Dry ☐ Damp ☐ Wet ☒	Dry ☐ Damp ☐ Wet ☐
Treated Previously with Dust Palliative?	Yes ☒ No ☐	Yes ☐ No ☐
If yes specify type and years	Type CAL Year(s) 81, 82, 83	Type Year(s)
Remarks	Cottage Road, Sand & Clay	

APPLICATION RATES	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT
Length	1.5 km	km
Width	12 ft	ft
Concentrate	N/A gal	gal
Dilution	2200 gal	gal
Dilution Ratio	- : -	:
Application Rate	0.34 gal/sq yd	gal/sq yd
	Second application July 18/84 ~~0.27 gal/sq.yd.~~	

RATING

1 None, 2 Light, 3 Moderate, 4 Heavy

SPRAYING	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT -
Date	84 06 13	
No. of Applications	Single ☐ Double ☒ Other ☐	Single ☐ Double ☐ Other ☐
Penetration	6 - 14 mm	mm
Tracking	1 ☒ 2 ☐ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Pick Up	1 ☒ 2 ☐ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Run Off	1 ☐ 2 ☒ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Splashing Onto Vehicle	1 ☐ 2 ☒ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Remarks		

9.5 EVALUATION OF DUST PALLIATIVE APPLICATION

ROAD Robert Dollar Dr. MUNICIPALITY Town of Bracebridge AADT —

NEW PRODUCT LOCATION: FROM Dead end St. TO _____

COMPARATIVE PRODUCT LOCATION: FROM - TO -

NEW PRODUCT COST - per km COMPARATIVE PRODUCT COST - per km

CONDITION OF GRANULAR GRADE	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT -
Granular From	Pit ☒ Quarry ☐	Pit ☐ Quarry ☐
Granular Condition	Clean ☒ Dirty ☐ Sandy ☐	Clean ☐ Dirty ☐ Sandy ☐
Graded	Yes ☒ No ☐	Yes ☐ No ☐
Compacted	Yes ☐ No ☒	Yes ☐ No ☐
Depth of Loose Float	4 cm	_____ cm
Moisture Condition of Grade	Dry ☐ Damp ☒ Wet ☐	Dry ☐ Damp ☐ Wet ☐
Treated Previously with Dust Palliative?	Yes ☒ No ☐	Yes ☐ No ☐
If yes specify type and years	Type — Year(s) —	Type Year(s)
Remarks	Graded prior to spraying to 4 cm. depth	

APPLICATION RATES	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT -
Length	0.1 km	_____ km
Width	32 ft	_____ ft
Concentrate	- gal	_____ gal
Dilution	400 gal	_____ gal
Dilution Ratio	- : -	_____ : _____
Application Rate	± 0.34 gal/sq yd	_____ gal/sq yd

RATING

1 None, 2 Light, 3 Moderate, 4 Heavy

SPRAYING	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT -
Date	84 06 13	_____
No. of Applications	Single ☐ Double ☐ Other ☒	Single ☐ Double ☐ Other ☐
Penetration	6 - 12 mm	_____ mm
Tracking	1 ☐ 2 ☒ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Pick Up	1 ☐ 2 ☒ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Run Off	1 ☒ 2 ☐ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Splashing Onto Vehicle	1 ☐ 2 ☒ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Remarks	Tembind 35 mixed in with grader.	

9.5 EVALUATION OF DUST PALLIATIVE APPLICATION

ROAD Leo Lake Road MUNICIPALITY TWP of Pittsburg AADT -

NEW PRODUCT LOCATION: FROM South Jct Hwy 15 TO North Jct Hwy 15

COMPARATIVE PRODUCT LOCATION: FROM - TO -

NEW PRODUCT COST - per km COMPARATIVE PRODUCT COST - per km

CONDITION OF GRANULAR GRADE	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT -
Granular From	Pit ☐ Quarry ☒	Pit ☐ Quarry ☐
Granular Condition	Clean ☒ Dirty ☐ Sandy ☐	Clean ☐ Dirty ☐ Sandy ☐
Graded	Yes ☒ No ☐	Yes ☐ No ☐
Compacted	Yes ☐ No ☒	Yes ☐ No ☐
Depth of Loose Float	0 to 4 cm	cm
Moisture Condition of Grade	Dry ☒ Damp ☐ Wet ☐	Dry ☐ Damp ☐ Wet ☐
Treated Previously with Dust Palliative?	Yes ☐ No ☒	Yes ☐ No ☐
If yes specify type and years	Type Year(s)	Type Year(s)
Remarks	Fresh Granular material	

APPLICATION RATES	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT -
Length	3.5 km	km
Width	12 ft	ft
Concentrate	- gal	gal
Dilution	6650 gal	gal
Dilution Ratio	- : -	:
Application Rate	Average 0.43 gal/sq yd	gal/sq yd

RATING

1 None, 2 Light, 3 Moderate, 4 Heavy

SPRAYING	NEW PRODUCT TEMBIND 35	COMPARATIVE PRODUCT -
Date	84 06 14	
No. of Applications	Single ☐ Double ☐ Other ☒	Single ☐ Double ☐ Other ☐
Penetration	5 to 25 mm	mm
Tracking	1 ☐ 2 ☒ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Pick Up	1 ☒ 2 ☐ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Run Off	1 ☐ 2 ☒ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Splashing Onto Vehicle	1 ☐ 2 ☒ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Remarks	Triple application (north) and mixing with grader (South)	

9.5 EVALUATION OF DUST PALLIATIVE APPLICATION

ROAD Concession 9 MUNICIPALITY Twp. of Tecumseth AADT -

NEW PRODUCT LOCATION: FROM Simcoe County Rd. #10 Westerly TO Adiala/Tecumseth Town Line

COMPARATIVE PRODUCT LOCATION: FROM Simcoe Rd. #10 Easterly only TO 10 Side Road

NEW PRODUCT COST - per km COMPARATIVE PRODUCT COST - per km

CONDITION OF GRANULAR GRADE	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT Waste Oil
Granular From	Pit ☒ Quarry ☐	Pit ☐ Quarry ☐
Granular Condition	Clean ☐ Dirty ☒ Sandy ☐	Clean ☐ Dirty ☐ Sandy ☐
Graded	Yes ☒ No ☐	Yes ☐ No ☐
Compacted	Yes ☐ No ☒	Yes ☐ No ☐
Depth of Loose Float	0 - 1 cm	cm
Moisture Condition of Grade	Dry ☒ Damp ☐ Wet ☐	Dry ☐ Damp ☐ Wet ☐
Treated Previously with Dust Palliative?	Yes ☐ No ☒	Yes ☐ No ☐
If yes specify type and years	Type Year(s)	Type Year(s)
Remarks General Condition of Grade: Hard	Slight wash board still present after grading. Loose flood in valleys& very hard on peaks.	Note: Has not present when oil sprayed.

APPLICATION RATES	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT waste oil
Length	3.2 km	km
Width	14 to 20 ft	ft
Concentrate	8300 gal	gal
Dilution	- gal	gal
Dilution Ratio	:_____	:_____
Application Rate	0.41 gal/sq yd	0.33 gal/sq yd (From J. Dunham)

RATING

1 None, 2 Light, 3 Moderate, 4 Heavy

SPRAYING	NEW PRODUCT Tembind 35	COMPARATIVE PRODUCT Waste oil
Date	84 06 22	84 06 07
No. of Applications	Single ☐ Double ☒ Other ☐	Single ☒ Double ☐ Other ☐
Penetration	2.6 mm	mm
Tracking	1 ☐ 2 ☒ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Pick Up	1 ☐ 2 ☐ 3 ☒ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Run Off	1 ☐ 2 ☐ 3 ☒ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Splashing Onto Vehicle	1 ☐ 2 ☐ 3 ☒ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Remarks		Note: Was not present when oil sprayed.

9.6 FOLLOW-UP DUST PALLIATIVE INSPECTIONS

Road 4th Line North

Municipality Town of Milton **AADT** 1000 ±

Rating

1 None, 2 Light, 3 Moderate, 4 Heavy

INSPECTION DATE: 84 05 31 **DATE SPRAYED:** 84 05 17

	New Product Tembind 35	Comparative Product Waste Oil
No. of Times Graded	0	0
Date of Last Grading	-	-
Dust From Car Travelling at 80 km/h	1☐ 2☒ 3☐ 4☐	1☒ 2☐ 3☐ 4☐
Potholing Frequency	1☒ 2☐ 3☐ 4☐	1☐ 2☒ 3☐ 4☐
Remarks	Very hard, "flint like". Sections at north end with alligator cracks.	3 or 4 small potholses at south end.

INSPECTION DATE: 84 07 05 **DATE SPRAYED:** 84 05 17

	New Product Tembind 35	Comparative Product Waste Oil
No. of Times Graded	0	0
Date of Last Grading	-	-
Dust From Car Travelling at 80 km/h	1☐ 2☒ 3☐ 4☐	1☒ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☐ 3☒ 4☒	1☐ 2☒ 3☐ 4☐
Remarks	Moderate to heavy potholing in sections.	Small potholes patched with asphalt emulsion and chips.

INSPECTION DATE: 84 08 03 **DATE SPRAYED:** 84 05 17

	New Product Tembind 35	Comparative Product Waste Oil
No. of Times Graded	0	0
Date of Last Grading	-	-
Dust From Car Travelling at 80 km/h	1☐ 2☐ 3☒ 4☐	1☒ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☐ 3☐ 4☒	1☒ 2☐ 3☐ 4☐
Remarks	Heavy potholing, needs grading. Hard surface gone.	Further patching with asphalt emulsion and chips.

9.6 FOLLOW-UP DUST PALLIATIVE INSPECTIONS

Road 4th Line

Municipality Town of Milton AADT 1000 ±

Rating

1 None, 2 Light, 3 Moderate, 4 Heavy

INSPECTION DATE: 84 09 27 DATE SPRAYED: 84 09 14 *

	New Product Tembind 35	Comparative Product Waste Oil
No. of Times Graded	1	0
Date of Last Grading	84 09 27	-
Dust From Car Travelling at 80 km/h	1☐ 2☒ 3☐ 4☐	1☒ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☒ 3☐ 4☐	1☐ 2☒ 3☐ 4☐
Remarks	Road graded and Tembind re-applied on 84 09 14. Three rough sections graded again on 84 09 27.	About 10 new small potholes requiring patching.

INSPECTION DATE: 84 11 06 DATE SPRAYED: 84 09 14 *

	New Product Tembind 35	Comparative Product Waste Oil
No. of Times Graded	2	0
Date of Last Grading	84 10 31 (Approx.)	-
Dust From Car Travelling at 80 km/h	1☐ 2☐ 3☐ 4☐	1☒ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☒ 3☐ 4☒	1☒ 2☐ 3☐ 4☐
Remarks * Second application of Tembind 35.	No dust rating, road was damp. Heavy potholing in three sections.	Oil in excellent condition.

INSPECTION DATE: _____ DATE SPRAYED: _____

	New Product	Comparative Product
No. of Times Graded		
Date of Last Grading		
Dust From Car Travelling at 80 km/h	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks		

9.6 FOLLOW-UP DUST PALLIATIVE INSPECTIONS

Road Various Streets

Municipality Town of Thornbury **AADT** -

Rating

1 None, 2 Light, 3 Moderate, 4 Heavy

INSPECTION DATE: 84 07 09 **DATE SPRAYED:** 84 06 04

	New Product Tembind 35	Comparative Product Waste Oil
No. of Times Graded	0	0
Date of Last Grading	-	-
Dust From Car Travelling at 60 km/h	1☐ 2☒ 3☐ 4☐	1☒ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☒ 3☐ 4☐	1☐ 2☒ 3☐ 4☐
Remarks	Streets in good condition.	Streets in good condition.

INSPECTION DATE: 84 10 01 **DATE SPRAYED:** 84 06 04

	New Product Tembind 35	Comparative Product Waste Oil
No. of Times Graded	0	0
Date of Last Grading	-	-
Dust From Car Travelling at 60 km/h	1☐ 2☐ 3☒ 4☐	1☒ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☒ 3☐ 4☐	1☐ 2☒ 3☐ 4☐
Remarks	2nd application of Tembind 35.	Oiled streets dust-free and smooth.

INSPECTION DATE: _____ **DATE SPRAYED:** _____

	New Product	Comparative Product
No. of Times Graded		
Date of Last Grading		
Dust From Car Travelling at 80 km/h	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks		

9.6 FOLLOW-UP DUST PALLIATIVE INSPECTIONS

Road Door Drive (St. Catharines)

Municipality St. Lawrence Seaway **AADT** -

Rating

1 None, 2 Light, 3 Moderate, 4 Heavy

INSPECTION DATE: 84 07 05 **DATE SPRAYED:** 84 06 04

	New Product Tembind 35	Comparative Product -
No. of Times Graded	0	-
Date of Last Grading	-	
Dust From Car Travelling at 60 km/h	1☐ 2☒ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☒ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks	Hard surface, slight alligator cracking.	

INSPECTION DATE: 84 09 27 **DATE SPRAYED:** -

	New Product Tembind 35	Comparative Product -
No. of Times Graded	0	
Date of Last Grading	-	
Dust From Car Travelling at 60 km/h	1☒ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☒ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks	Good condition.	

INSPECTION DATE: _____ **DATE SPRAYED:** _____

	New Product	Comparative Product
No. of Times Graded		
Date of Last Grading		
Dust From Car Travelling at 80 km/h	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks		

9.6 FOLLOW-UP DUST PALLIATIVE INSPECTIONS

Road South Grimsby Road 18

Municipality Township of West Lincoln **AADT** 350 (estimated)

Rating

1 None, 2 Light, 3 Moderate, 4 Heavy

INSPECTION DATE: 84 07 05 **DATE SPRAYED:** 84 06 05

	New Product Tembind 35	Comparative Product Calcium Chloride
No. of Times Graded	0	0
Date of Last Grading	-	
Dust From Car Travelling at 80 km/h	1☐ 2☐ 3☒ 4☐	1☐ 2☐ 3☒ 4☐
Potholing Frequency	1☐ 2☐ 3☒ 4☐	1☐ 2☐ 3☒ 4☐
Remarks		

INSPECTION DATE: 84 09 27 **DATE SPRAYED:** 84 06 05

	New Product Tembind 35	Comparative Product Calcium Chloride
No. of Times Graded	2	2
Date of Last Grading	84 09 26	84 09 26
Dust From Car Travelling at 80 km/h	1☐ 2☐ 3☐ 4☒	1☐ 2☐ 3☐ 4☒
Potholing Frequency	1☒ 2☐ 3☐ 4☐	1☒ 2☐ 3☐ 4☐
Remarks	Just graded. Very dusty.	Just graded. Very dusty.

INSPECTION DATE: _____ **DATE SPRAYED:** _____

	New Product	Comparative Product
No. of Times Graded		
Date of Last Grading		
Dust From Car Travelling at 80 km/h	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks		

9.6 FOLLOW-UP DUST PALLIATIVE INSPECTIONS

Road Concession 19, Township of Blanshard

Municipality Town of St. Mary's AADT

Rating

1 None, 2 Light, 3 Moderate, 4 Heavy

INSPECTION DATE: 84 07 31 DATE SPRAYED: 84 06 12

	New Product Tembind 35	Comparative Product Calcium Chloride
No. of Times Graded	0	0
Date of Last Grading	1	1
Dust From Car Travelling at 80 km/h	1☐ 2☒ 3☐ 4☐	1☐ 2☒ 3☐ 4☐
Potholing Frequency	1☐ 2☒ 3☐ 4☐	1☒ 2☐ 3☐ 4☐
Remarks	Loose float windrowed over hard surface.	Loose float windrowed over hard surface.

INSPECTION DATE: _____ DATE SPRAYED: _____

	New Product	Comparative Product
No. of Times Graded		
Date of Last Grading		
Dust From Car Travelling at 80 km/h	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks		

INSPECTION DATE: _____ DATE SPRAYED: _____

	New Product	Comparative Product
No. of Times Graded		
Date of Last Grading		
Dust From Car Travelling at 80 km/h	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks		

9.6 FOLLOW-UP DUST PALLIATIVE INSPECTIONS

Road Various Streets

Municipality Town of St. Mary's **AADT** -

Rating

1 None, 2 Light, 3 Moderate, 4 Heavy

INSPECTION DATE: 84 07 31 **DATE SPRAYED:** 84 06 12

	New Product Tembind 35	Comparative Product -
No. of Times Graded	0	
Date of Last Grading	-	
Dust From Car Travelling at 60 km/h	1☐ 2☒ 3☒ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☒ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks	Light to moderat dust depending on traffic volume.	

INSPECTION DATE: _____ **DATE SPRAYED:** _____

	New Product	Comparative Product
No. of Times Graded		
Date of Last Grading		
Dust From Car Travelling at 60 km/h	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks		

INSPECTION DATE: _____ **DATE SPRAYED:** _____

	New Product	Comparative Product
No. of Times Graded		
Date of Last Grading		
Dust From Car Travelling at 80 km/h	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks		

9.6 FOLLOW-UP DUST PALLIATIVE INSPECTIONS

Road Stephen's Bay Road

Municipality Town of Bracebridge AADT -

Rating

1 None, 2 Light, 3 Moderate, 4 Heavy

INSPECTION DATE: 84 07 27 DATE SPRAYED: 84 07 18 (2nd Appl.)

	New Product Tembind 35	Comparative Product -
No. of Times Graded	0	
Date of Last Grading	-	
Dust From Car Travelling at 60 km/h	1☐ 2☒ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☒ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks		

INSPECTION DATE: 84 08 27[1] DATE SPRAYED: 84 07 18 (2nd Appl.)

	New Product Tembind 35	Comparative Product -
No. of Times Graded	1	
Date of Last Grading	-	
Dust From Car Travelling at 60 km/h	1☐ 2☐ 3☒ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☒ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks	Hills and corners turned dusty and required grading.	

1. Information from Town of Bracebridge.

INSPECTION DATE: DATE SPRAYED:

	New Product	Comparative Product
No. of Times Graded		
Date of Last Grading		
Dust From Car Travelling at 80 km/h	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks		

9.6 FOLLOW-UP DUST PALLIATIVE INSPECTIONS

Road Robert Dollar Drive

Municipality Town of Bracebridge AADT -

Rating

1 None, 2 Light, 3 Moderate, 4 Heavy

INSPECTION DATE: 84 07 27 DATE SPRAYED: 84 06 13

	New Product Tembind 35	Comparative Product --------
No. of Times Graded	0	
Date of Last Grading	—	
Dust From Car Travelling at 60 km/h	1☐ 2☐ 3☒ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☐ 3☐ 4☒	1☐ 2☐ 3☐ 4☐
Remarks	Dusty, rough and needs grading	

INSPECTION DATE: _____ DATE SPRAYED: _____

	New Product	Comparative Product
No. of Times Graded		
Date of Last Grading		
Dust From Car Travelling at 80 km/h	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks		

INSPECTION DATE: _____ DATE SPRAYED: _____

	New Product	Comparative Product
No. of Times Graded		
Date of Last Grading		
Dust From Car Travelling at 80 km/h	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks		

9.6 FOLLOW-UP DUST PALLIATIVE INSPECTIONS

Road Leo Lake Road

Municipality Township of Pittsburg **AADT** _____

Rating

1 None, 2 Light, 3 Moderate, 4 Heavy

INSPECTION DATE: 84 06 25 **DATE SPRAYED:** 84 06 14

	New Product Tembind 35	Comparative Product -
No. of Times Graded	0	
Date of Last Grading	-	
Dust From Car Travelling at 80 km/h	1 ☒ 2 ☐ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Potholing Frequency	1 ☒ 2 ☐ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Remarks	Good condition. No difference between sections.	

INSPECTION DATE: 84 08 21 **DATE SPRAYED:** _____

	New Product Tembind 35	Comparative Product -
No. of Times Graded	0	
Date of Last Grading	-	
Dust From Car Travelling at 80 km/h	1 ☐ 2 ☒ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Potholing Frequency	1 ☐ 2 ☒ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Remarks	Good condition. No difference between sections.	

INSPECTION DATE: _____ **DATE SPRAYED:** _____

	New Product	Comparative Product
No. of Times Graded		
Date of Last Grading		
Dust From Car Travelling at 80 km/h	1 ☐ 2 ☐ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Potholing Frequency	1 ☐ 2 ☐ 3 ☐ 4 ☐	1 ☐ 2 ☐ 3 ☐ 4 ☐
Remarks		

9.6 FOLLOW-UP DUST PALLIATIVE INSPECTIONS

Road Beach Road

Municipality Township of Tiny **AADT** -

Rating

1 None, 2 Light, 3 Moderate, 4 Heavy

INSPECTION DATE: 84 07 09 **DATE SPRAYED:** 84 06 13

	New Product Tembind 35	Comparative Product Waste Oil
No. of Times Graded	0	0
Date of Last Grading	-	-
Dust From Car Travelling at 80 km/h	1☐ 2☒ 3☐ 4☐	1☒ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☒ 3☐ 4☐	1☐ 2☒ 3☐ 4☐
Remarks	Hard stabilized surface. Good condition.	Good condition.

INSPECTION DATE: 84 10 01 **DATE SPRAYED:** 84 06 13

	New Product Tembind 35	Comparative Product Waste Oil
No. of Times Graded	3	3
Date of Last Grading	84 09 17	84 09 17
Dust From Car Travelling at 80 km/h	1☐ 2☒ 3☐ 4☐	1☐ 2☒ 3☐ 4☐
Potholing Frequency	1☒ 2☐ 3☐ 4☐	1☒ 2☐ 3☐ 4☐
Remarks	Dusty after grading. Dust controlled again after 2 or 3 showers.	

INSPECTION DATE: _____ **DATE SPRAYED:** _____

	New Product	Comparative Product
No. of Times Graded		
Date of Last Grading		
Dust From Car Travelling at 80 km/h	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☐ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks		

9.6 FOLLOW-UP DUST PALLIATIVE INSPECTIONS

Road Concession 9

Municipality Township of Tecumseth AADT

Rating

1 None, 2 Light, 3 Moderate, 4 Heavy

INSPECTION DATE: 84 08 18 DATE SPRAYED: 84 06 22

	New Product Tembind 35	Comparative Product Waste Oil
No. of Times Graded	0	0
Date of Last Grading	-	-
Dust From Car Travelling at 80 km/h	1☐ 2☒ 3☐ 4☐	1☐ 2☒ 3☐ 4☐
Potholing Frequency	1☐ 2☒ 3☐ 4☐	1☐ 2☐ 3☒ 4☐
Remarks	Good condition.	Approximately 25% of oiled surface is loose.

INSPECTION DATE: 84 10 02 DATE SPRAYED: 84 06 22

	New Product Tembind 35	Comparative Product Waste Oil
No. of Times Graded	1	2
Date of Last Grading	84 09 28	84 09 28
Dust From Car Travelling at 80 km/h	1☐ 2☐ 3☐ 4☒	1☐ 2☐ 3☒ 4☐
Potholing Frequency	1☒ 2☐ 3☐ 4☐	1☐ 2☐ 3☒ 4☐
Remarks	Dusty from grading.	50% of area smooth, no dust. 50% with moderate dust and potholes.

INSPECTION DATE: 84 11 02 DATE SPRAYED: 84 06 22

	New Product Tembind 35	Comparative Product Waste Oil
No. of Times Graded	3	5
Date of Last Grading	84 10 26	84 10 26
Dust From Car Travelling at 80 km/h	1☐ 2☐ 3☒ 4☐	1☐ 2☐ 3☒ 4☐
Potholing Frequency	1☐ 2☒ 3☐ 4☐	1☐ 2☒ 3☐ 4☐
Remarks	Light dust in damp areas. Dusty in dry areas.	30% of area smooth, light dust. 70% moderate dust and potholes.

9.6 FOLLOW-UP DUST PALLIATIVE INSPECTIONS

Road Gulley Road, Lake Road, Ardoch Road

Municipality Palmerston, North and South Canonto **AADT** -

Rating

1 None, 2 Light, 3 Moderate, 4 Heavy

INSPECTION DATE: 84 08 28	DATE SPRAYED: 84 06 26	
GULLEY ROAD	New Product Tembind 35	Comparative Product -
No. of Times Graded	2	
Date of Last Grading	84 08 20	
Dust From Car Travelling at 80 km/h	1☐ 2☐ 3☒ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☒ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks	Heavy dust on hills. Hills graded twice.	

INSPECTION DATE: 84 08 28	DATE SPRAYED: 84 06 26	
LAKE ROAD (OMPAH)	New Product Tembind 35	Comparative Product -
No. of Times Graded	1	
Date of Last Grading	84 08 14	
Dust From Car Travelling at 50 km/h	1☐ 2☒ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☒ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks	Hills graded once. Moderate dust on hills.	

INSPECTION DATE: 84 08 28	DATE SPRAYED: 84 06 26	
ARDOCH ROAD (OMPAH)	New Product Tembind 35	Comparative Product -
No. of Times Graded	2	
Date of Last Grading	84 08 14	
Dust From Car Travelling at 50 km/h	1☐ 2☒ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Potholing Frequency	1☐ 2☒ 3☐ 4☐	1☐ 2☐ 3☐ 4☐
Remarks	Hills graded twice. Heavy dust on hills.	

135 St. Clair Avenue West
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Toronto, Ontario
M4V 1P5

135 ouest, avenue St. Clair
Bureau 100
Toronto (Ontario)
M4V 1P5

September 18, 1985

Mr. J.J. Armstrong
Head, Technical Policy Section
Environmental Office, MTC
1201 Wilson Ave.
Downsview, Ontario
M3M 1J8

Dear Mr. Armstrong:

Re: Use of Tembind Road Dust Suppressant
on Leo Lake Road

As a result of the meeting held on 16 May, 1985 between MOE, MTC, Can Am Oil Services and Temfibre Inc., to discuss Tembind dust suppressant, a gravel road was treated with the product to test both its efficiency and potential for environmental impairment.

The test road, selected by Can-Am Oil Services, is known as Leo Lake Road, and is about 3 km long, running off Highway 15, 8 km north of Joyceville in S.E. Ontario. The road curves and undulates steeply with few level stretches, and at one point crosses a waterway served by a large culvert. At this point, the road approaches the water to within 1 metre on either side. This particular area was considered good for test purposes, being highly sensitive to dust suppressant overspray or run-off. In upcoming MOE guidelines for the use of road dust suppressants, application of chemicals in such sensitive areas is discouraged. However, for test purposes, the Tembind suppressant was allowed to be sprayed in this location.

Personnel present during the day of the test, June 7, 1985, were the writer, Mr. Murray Cressman of Can-Am Oil Services, Mr. Fred Scott of the township, Mr. Bruce Metcalfe of the MOE Kingston District Office and a representative of the MTC.

Prior to spraying the Tembind, the road was graded. MOE staff sampled the waterway described above to provide background water quality data. Tembind was then sprayed along the length of the road at a rate of approximately 1.5 L/m^2. Visual observations showed that overspray was negligible to non-existant and that the Tembind soaked into, or adhered readily to the road surface, and within 20-30 minutes a vehicle could drive the road with little or no chemical "pick-up". No evidence of run-off or overspray was seen at the water crossing. In addition, although a little odour was noted after spraying the chemical, it could be described as being similar to that of fresh cardboard and not particularly offensive. An hour after Tembind application, the waterway was again sampled by the MOE in the chance that some chemical may have entered the water through subterranean channeling, or short circuit.

Since the test, Mr. Metcalfe of the MOE has visually inspected the road several times over a period of about 2 months and has seen no evidence of run-off. Due to the extremely dark colour of the Tembind, it might be safe to suppose that even with rain dilution, some evidence of surface run-off would be seen. On July 18, 1985, after a particularly heavy rainfall, reportedly the first significant rain since applying Tembind, the water at the road crossing was again sampled. The results of both pre and post Tembind application water samples are shown in the table. It was difficult to select analytical parameters for the samples due to lack of experience with the Tembind. However, due to the strong organic nature of the chemical and the known presence of ammonia, or ammonium compounds, the total Kjeldahl nitrogen test (TKN), the ammonia test (NH_3), the dissolved organic carbon test (DOC), and the dissolved inorganic carbon test (DIC), were felt to be appropriate indicators.

TABLE OF ANALYTICAL RESULTS

SAMPLE	TKN	NH_3	DOC	DIC	
Before Application 7/6/85	0.48	0.05	4.8	16.0	
1 Hour After Application 7/6/85	0.63	0.09	5.3	16.6)	
	0.47	0.05	4.6	15.8)	2 locations
5 Weeks After Application 18/07/85	0.48	0.04	4.7	14.4)	
	0.50	0.04	4.6	14.8)	3 locations
	0.59	0.07	4.9	15.0)	

All results in mg/L

TKN and NH_3 are expressed as

N - nitrogen, and not as the entire molecule(s)

While the results vary slightly from place to place, they typify the range of results generally seen on multiple samples in work of this nature, and show no evidence of contamination from an outside source.

Although the test can not be considered entirely definitive, (that would require many weeks of very intensive groundwater and surface water monitoring and analyses, tracer studies, etc.), I feel it served as a good indication that no environmental effect or impairment was measurable at the location under the conditions of the test.

In addition to on-site testing, a sample of Tembind obtained directly from the truck, was returned to the MOE Toronto laboratory for microbiological testwork. Ames tests showed that Tembind is toxic but non-mutagenic to bacteria. While many substances can prove toxic to bacteria if present in high enough concentrations, the mutagenicity test is perhaps of more significatnce as a positive result could have precluded the use of Tembind as a road dust suppressant.

Further biological tests on Tembind are planned, including its toxicity to higher aquatic life forms and fish. Results will be forwarded to you as they become available.

In the meantime, results form this test indicated that there is no good reason to prohibit the use of Tembind as a road dust suppressant and suggest its use may continue unless future experience shows otherwise. The Waste Management Branch is planning a further study to assess the off site impact of applying various dust suppressants. Results from that study will be used to determine the viability of long-term use of various liquid industrial wastes as dust suppressants.

Yours truly,

John Smart
Project Officer
Waste Management Branch

JS/sp
IN 06 18
1899L